F I G.1

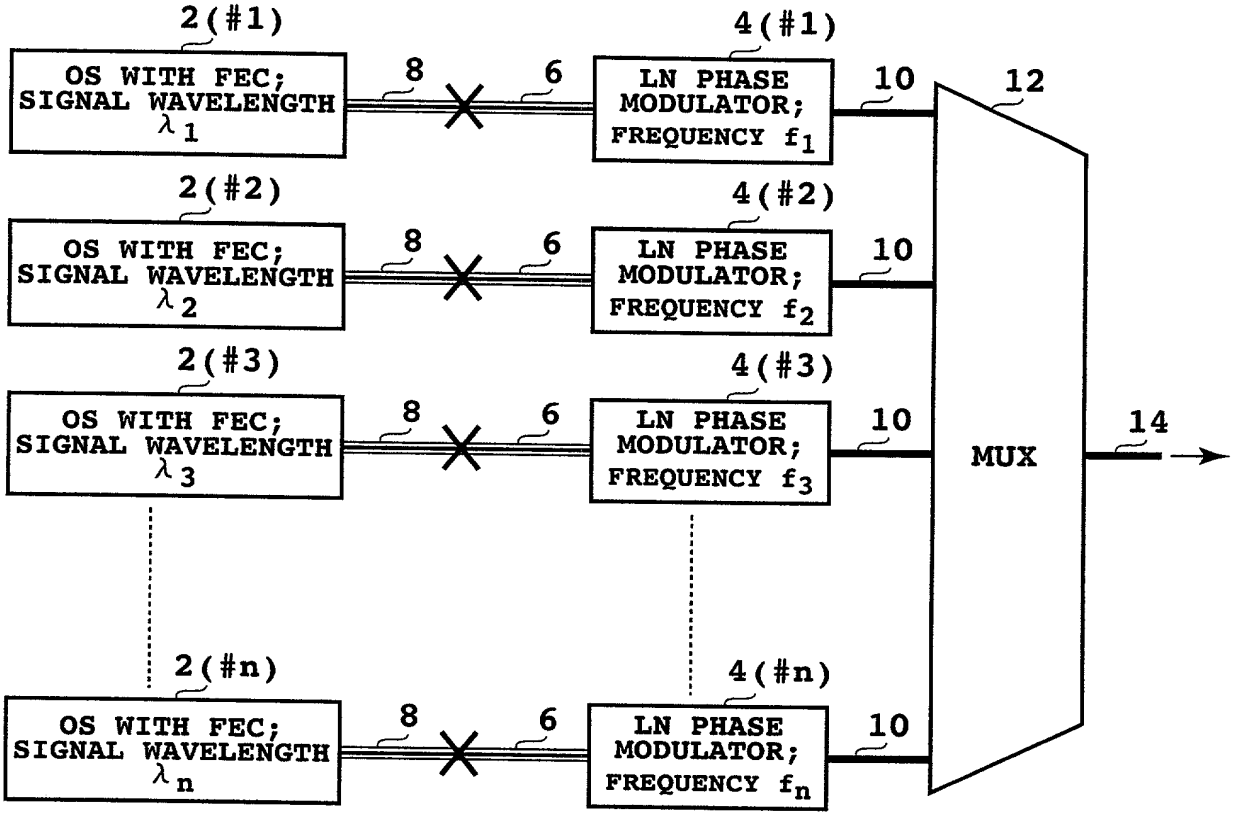

2(#1)
OS WITH FEC; SIGNAL WAVELENGTH λ_1
8
6
4(#1)
LN PHASE MODULATOR; FREQUENCY f_1
10
12
2(#2)
OS WITH FEC; SIGNAL WAVELENGTH λ_2
8
6
4(#2)
LN PHASE MODULATOR; FREQUENCY f_2
10
2(#3)
OS WITH FEC; SIGNAL WAVELENGTH λ_3
8
6
4(#3)
LN PHASE MODULATOR; FREQUENCY f_3
10
MUX
14
2(#n)
OS WITH FEC; SIGNAL WAVELENGTH λ_n
8
6
4(#n)
LN PHASE MODULATOR; FREQUENCY f_n
10

FIG.2

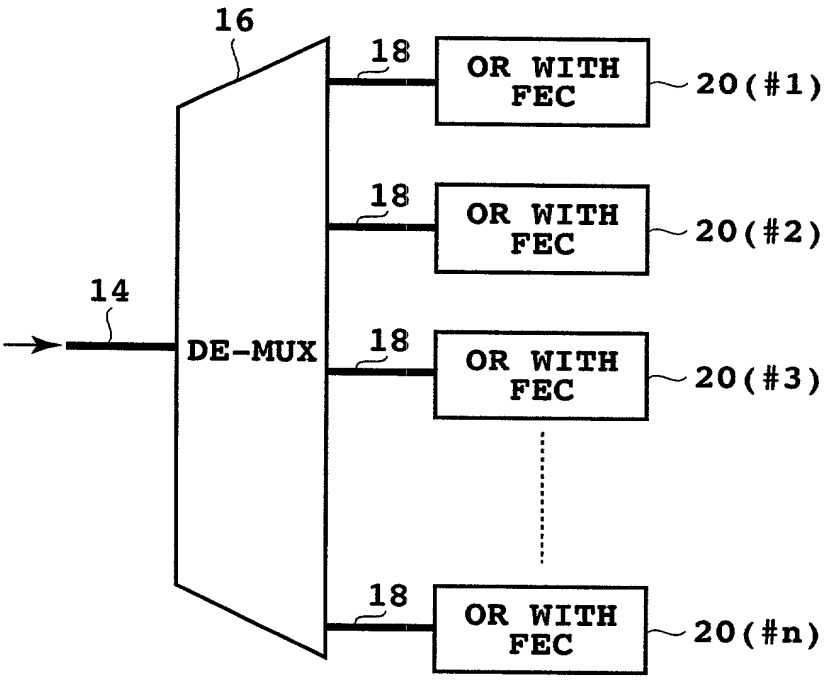

16
18
OR WITH FEC
20(#1)
18
OR WITH FEC
20(#2)
14
DE-MUX
18
OR WITH FEC
20(#3)
18
OR WITH FEC
20(#n)

FIG.3

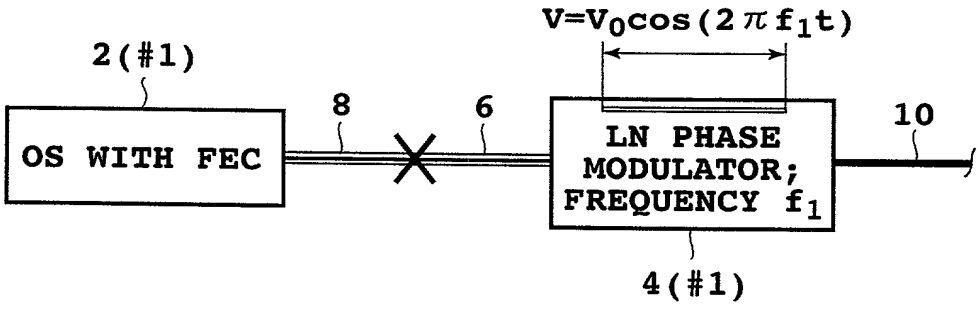

V=V0cos(2πf1t)
2(#1)
OS WITH FEC
8
6
LN PHASE MODULATOR; FREQUENCY f1
10
4(#1)

FIG.4

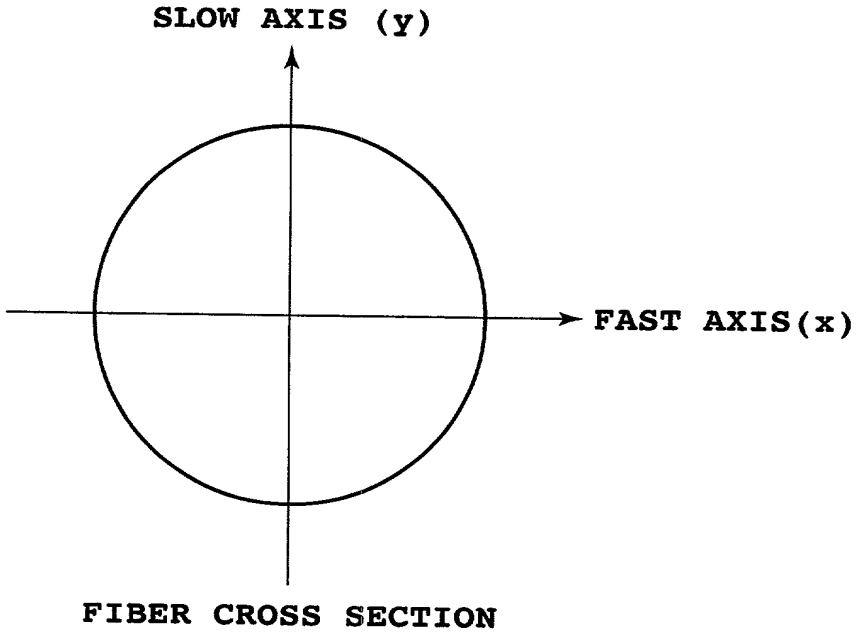


FIG.5

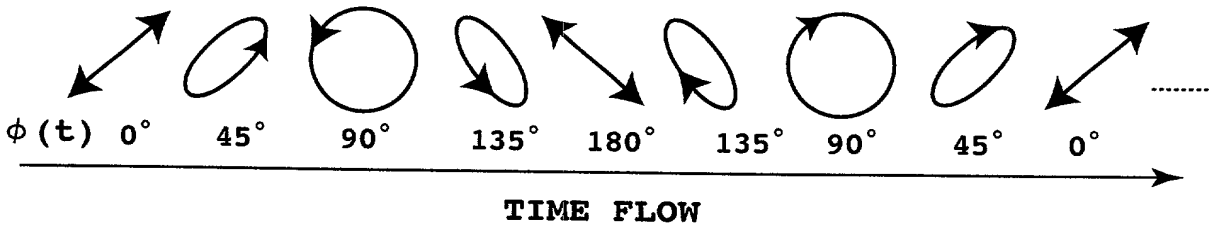


FIG.6

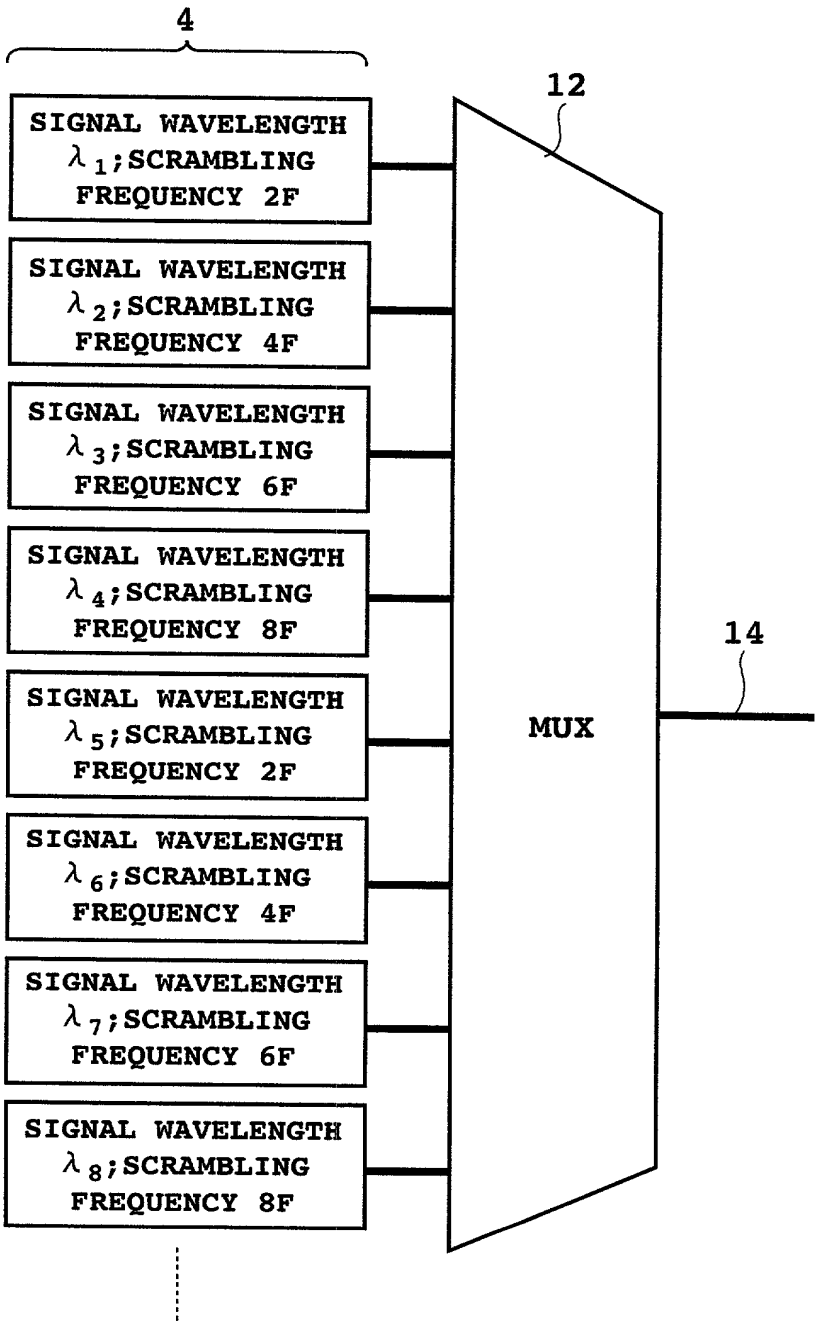

4
12
SIGNAL WAVELENGTH λ1;SCRAMBLING FREQUENCY 2F
SIGNAL WAVELENGTH λ2;SCRAMBLING FREQUENCY 4F
SIGNAL WAVELENGTH λ3;SCRAMBLING FREQUENCY 6F
SIGNAL WAVELENGTH λ4;SCRAMBLING FREQUENCY 8F
SIGNAL WAVELENGTH λ5;SCRAMBLING FREQUENCY 2F
SIGNAL WAVELENGTH λ6;SCRAMBLING FREQUENCY 4F
SIGNAL WAVELENGTH λ7;SCRAMBLING FREQUENCY 6F
SIGNAL WAVELENGTH λ8;SCRAMBLING FREQUENCY 8F
MUX
14

FIG.7

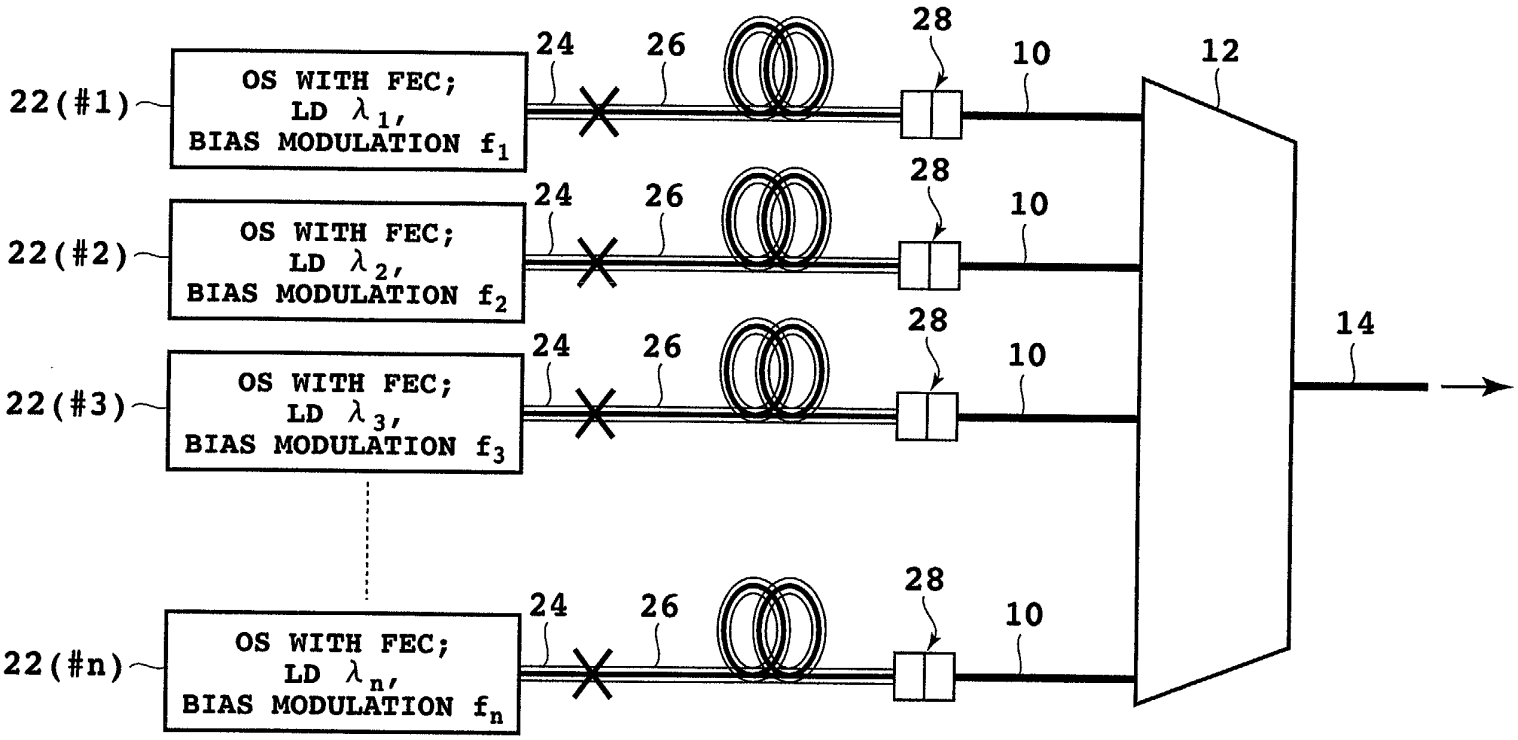

22(#1)
OS WITH FEC;
LD λ1,
BIAS MODULATION f1
22(#2)
OS WITH FEC;
LD λ2,
BIAS MODULATION f2
22(#3)
OS WITH FEC;
LD λ3,
BIAS MODULATION f3
22(#n)
OS WITH FEC;
LD λn,
BIAS MODULATION fn
24
26
28
10
12
14

FIG.8A

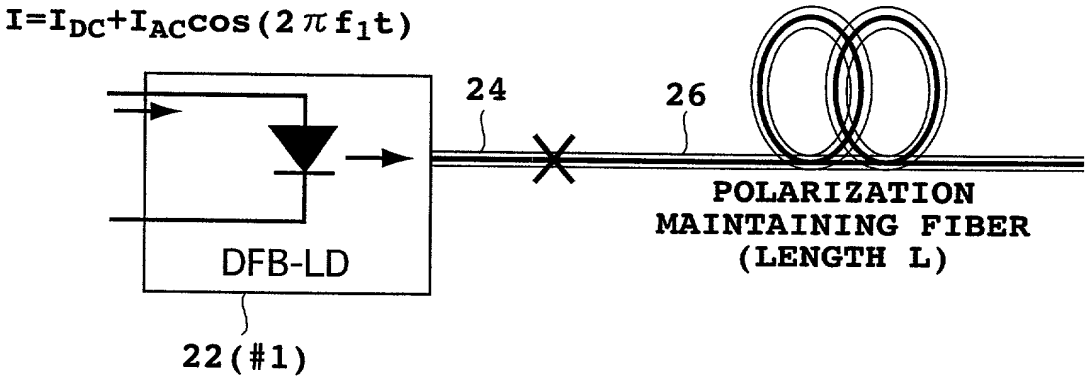
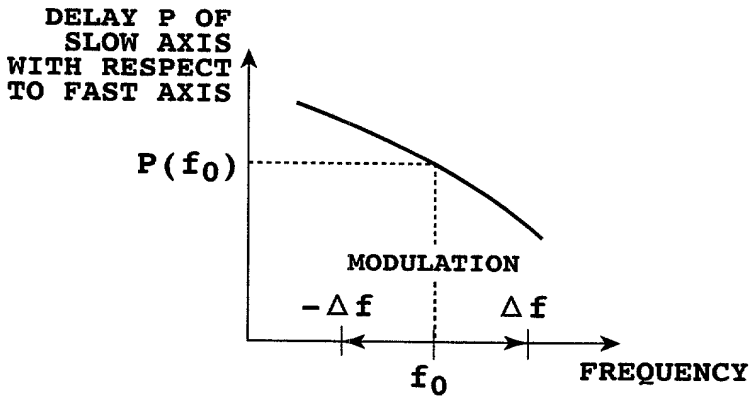


FIG.8B



$$\text{PHASE DIFFERENCE}\ \phi \propto D(f_0)+\left(\frac{\partial D}{\partial f}\right)_{f=f_0}\Delta f$$